



American Icons in a Metropolitan Grassland

.....
A Visitor Study and Report on the Connections between People, Place
and Bison Conservation at the Rocky Mountain Arsenal National
Wildlife Refuge



Courtesy of Denver Zoo

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About Denver Zoo

Denver Zoo (DZ) is an Association of Zoo and Aquariums (AZA) accredited institution and a leader among Zoos in wildlife conservation. DZ has its own Conservation and Research Department with professional scientific staff. The Department advances an innovative blend of social and ecological science, conservation action, community engagement, and conservation capacity-building to protect wild species in wild places regionally and across the globe. Since 1996, Denver Zoo has dedicated staff and funding to support more than 600 conservation projects in 62 countries on all seven continents. Each year, DZ commits over 2 million dollars to advance wildlife conservation in alignment with its mission: “secure a better world for animals through human understanding,” and in collaboration with partners, including protected area managers. DZ’s Department of Conservation and Research implements the Open Standards for the Practice of Conservation to plan its conservation strategies and evaluate their effectiveness – a best practice in the field.

One of the Department of Conservation and Research’s central foci is saving grassland ecosystems and their wildlife in three regions of the world: Botswana’s Central Kalahari landscape, Mongolia’s semi-arid steppe and Colorado and Northern New Mexico’s mountain-plains interface. In Colorado and northern New Mexico, plains bison are one of Denver Zoo’s conservation targets. In fact, Denver Zoo manages the Rio Mora National Wildlife Refuge in northern New Mexico, which is home to a herd of tribally-owned conservation bison. Denver Zoo is also a research partner affiliated with the Laramie Foothills Bison Herd in northern Colorado. In addition, DZ was a key player in initial efforts to save the American (plains) bison from extinction. In the early twentieth century, DZ acquired several of the few remaining plains bison to hold in the public trust at what was then called City Park Zoo; these bison were an important seed herd for bison recovery efforts in the Denver foothills and across the West. This project builds on DZ’s commitment to working with partners to advance bison conservation regionally and across North America.

Acknowledgements: This project would not have happened without support from the Rocky Mountain Arsenal National Wildlife Refuge staff, and their interest in understanding the human dimensions of bison at the Refuge. Special thanks to David Lucas, Nick Kaczor and Bruce Hastings for their time and contributions to this project. In addition, we are indebted to Denver Zoo Research Fellow, Kel Rayens, who brilliantly conducted much of the field research and data analysis.

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Executive Summary

Introduction

Denver Zoo shares the USFWS commitment to plains bison conservation in metro Denver and beyond. Denver Zoo has played a pivotal role in plains bison conservation since the early 1900s. At the turn of the twentieth century, Denver Zoo helped to save the species from the brink of extinction by acquiring several of the last remaining bison to create a small herd for public benefit in Denver, Colorado (Etter 1995). Today, DZ continues to advance bison conservation on the USFWS Rio Mora National Wildlife Refuge, which DZ manages, and through interdisciplinary partnerships with tribal nations, protected areas and other allies. DZ is interested in catalyzing bison conservation on the ground and furthering the body of knowledge about how bison recovery is an important social and ecological processes for maintaining intact and culturally meaningful grassland landscapes. We seek to apply this knowledge to improving bison conservation projects in Colorado, New Mexico and beyond, and are delighted to collaborate on this project with the Rocky Mountain Arsenal staff, and on future efforts to engage metro-Denver's urban public in grassland restoration and conservation.

Study Overview

This study makes an important contribution to visitor management and human dimensions of wildlife research at the Rocky Mountain Arsenal National Wildlife Refuge (RMA or Refuge) in metropolitan Denver. Denver Zoo researchers conducted visitor-intercept interviews to collect data about how the Refuge's conservation bison herd, reintroduced in 2009, is shaping the visitor experience. This report summarizes the 2015 findings of this work including the socio-demographic characteristics of Refuge visitors, their self-reported site use patterns and experiences, and their sense of connection to this grassland protected area and its conservation bison herd. Research findings illuminate greater opportunities for RMA, as an urban refuge, to attract and engage Denver publics and other visitors through its bison conservation herd, cementing the value of RMA herd for social and ecological benefit.

Study Design and Methods

Denver Zoo's conservation social science team conducted 100 visitor-intercept interviews with Refuge visitors from early July to late August 2015. These interviews followed the pilot testing of a structured interview guide in mid-June 2015. A multi-stage random sampling design for the visitor intercepts ensured a highly representative sample. Interviews were conducted across a range of weeks, days (e.g. weekdays and weekends), and times (morning and afternoon) to capture a variety of visitors.



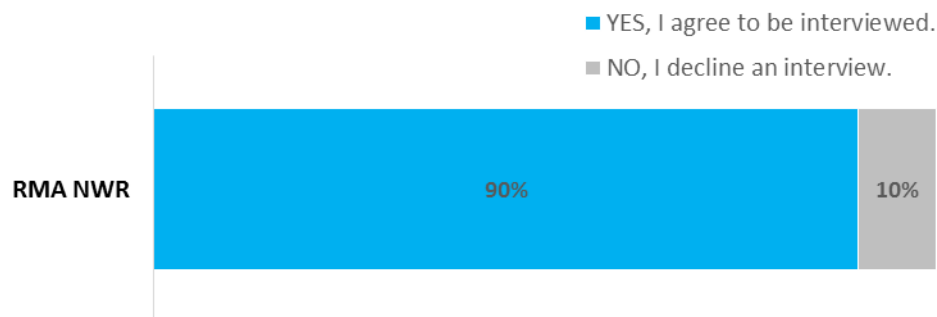
Key Research Findings

- 1. The Rocky Mountain Arsenal NWR had a high visitor response rate for the 2015 study; 9 in 10 visitors agreed to be interviewed for this research.** This high response rate indicates a high degree of cooperation by Refuge visitors and gives us greater confidence that the data from the study sample are representative of the larger Refuge visitor population.

Visitor Intercept Interview Response Rate at RMA

9 in 10 Refuge visitors agreed to be interviewed.

N=111



- 2. Visitors to the Arsenal in 2015 were typically white, college-educated, Generation Xers between the ages of 36 and 55 who visit in a group of two adults and no children.** These results closely mirror the demographic findings from the 2012 Visitor Study (Dietsch et al. 2013) but contrast the ethnic diversity of the seven county metro Denver region in which 66% of residents are white, 22% are Hispanic and 6% are black (U.S. Census Bureau, ACS 2010).

RMA Visitor Demographics Summary	
2015 Visitor Study	2012 Visitor Survey
<ul style="list-style-type: none">53% female; 46% male; 1% female-to-male transgender87% white; 6% Hispanic; 1% black; 2% Asian, 2% American Indian; 2% Multiple ethnicities66% Bachelor's degree or higher2 adults, no children	<ul style="list-style-type: none">52% female; 48% male95% white; 6% Hispanic; 1% black66% Bachelor's degree or higher2 adults, 1 child



3. Visitor Use Profile: More than two-thirds (72%) of visitors were visiting the Refuge for the first time, almost half (49%) planned to spend 1 to 2 hours on-site and the most popular visitor recreation activity was day hiking (38%) followed by taking a scenic drive (24%). Visitors who knew where they planned to recreate most frequently mentioned the Wildlife Drive, Lake Mary and/or Lake Ladora. 1 in 5 visitors found out about the Refuge online (23%) or by word-of-mouth from a friend or family member (22%).

Rocky Mountain Arsenal National Wildlife Refuge: Visitor Use Profile
<ul style="list-style-type: none">• 72% are first-time visitors• Average 2 hours on-site (49% said between 1 and 2 hours)• 38% are Day Hiking; 24% are Taking a Scenic Drive• Recreate at the Wildlife Drive or at Lake Mary and/or Lake Ladora• Heard of the park Online (23%); From a friend or family member (22%); From a map (online or print) (13%); and Driving by (12%)

4. Overall, Refuge visitors demonstrated a strong sense of connection to the Refuge reporting a mean place attachment scale score of 4.15 (where 4=Agree and 5=Strongly Agree), and the majority said the Refuge was important to them as part of the lands protected by the National Wildlife Refuge system.

5. The bison herd motivates Refuge visitation. Almost 1 in 5 people (20%) described the bison herd as one of the reasons inspiring their visit.

Bison are a Motivation for Refuge Visitation

16% of visitors (almost 1 in 5) mentioned the bison herd as one of the motivations for their Refuge visit.

N=100

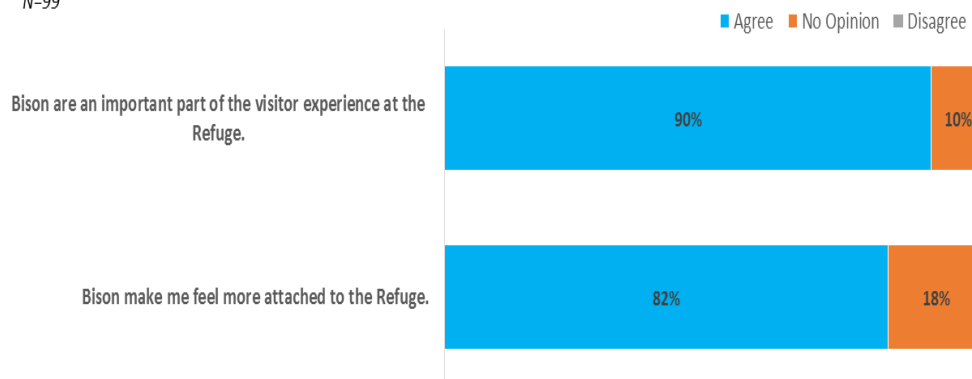




6. Bison are an important part of the visitor experience at the Refuge. Nine in 10 visitors agreed with the statement, “Bison are an important part of the visitor experience at the refuge.” Eight in 10 visitors agreed that the bison herd increased their sense of connection to the Refuge.

2015 visitors overwhelmingly agreed that bison were an important part of the Refuge visitor experience, and enhanced their sense of connection to the Refuge.

N=99



7. When asked to share their knowledge about Refuge bison herd, visitors consistently voiced their appreciation and awe for the herd but did not know a lot about the herd’s origin, ownership, or importance in the contemporary bison conservation movement.

In conclusion, the Refuge’s bison herd motivates visitation for almost 20% of Refuge visitors. The herd is seen by visitors as an asset and natural amenity that adds value to their experience and sense of connection to the Refuge. Looking forward, the Refuge’s conservation bison herd is an opportunity for attracting broader audiences and supporters, across metropolitan Denver and more globally, to the Refuge and connecting them to the grassland ecosystem it protects. Moreover, the Refuge bison herd is a highly recognizable ambassador herd (and part of the U.S. Fish and Wildlife Service’s bison meta-population critical for conservation) that can be interpreted to more effectively demonstrate to urban audiences the importance and value of grassland restoration and contemporary bison recovery across the American West.

Management and Community Engagement Recommendations

In light of this report’s key findings on the meaning and importance of bison to the Refuge visitor community, we (the report authors) recommend the following actions for the Rocky Mountain Arsenal NWR and its partners:

1. Build on the appeal of Refuge bison as a charismatic species that add value to the visitor experience to motivate metropolitan Denver youth and adults to visit this important protected area. Highlighting the Refuge bison may be a key “hook” for introducing these urban audiences to the grasslands in their backyard.
2. In concert with partners, develop more on-site programming, citizen science and site interpretation opportunities to engage metropolitan Denver youth and adults in a culture of grassland stewardship. These opportunities will foster longer-term relationships and deeper connections to this landscape.



3. Explore if and how on-site bison programming can help increase Refuge audience diversity, and engage under-served audiences in metropolitan Denver. Building on the work of Dietsch et al. (2013), and through additional focus groups and community assessments, understand if bison (and wildlife) appeal to ethnically diverse urban audiences of prospective visitors, and identify how to best engage these communities.
4. To foster a better understanding of the purpose, importance and origin of the Refuge bison herd among Refuge visitors and audiences, provide additional information and interpretation about the Refuge bison herd on social media, and through interpretive signage along the Wildlife Trail. Also, include information about these topics in any on-site programming.
5. Through additional visitor studies, continue to monitor the Refuge visitor population's experiences with and knowledge about the Refuge bison herd.



Introduction

This study, *American Icons in Metropolitan Grasslands: People, Place and Bison Conservation in Denver, Colorado*, makes an important contribution to visitor management and human dimensions of wildlife research at the Rocky Mountain Arsenal National Wildlife Refuge (RMA or Refuge) in metropolitan Denver. It documents how the Rocky Mountain Arsenal National Wildlife Refuge (the Refuge) conservation bison herd is shaping the visitor experience. Existing literature on ecological recovery projects demonstrates how these initiatives are social processes that reshape natural landscapes, social relations to wildlife and place, resource governance and human well-being. However, there is little knowledge to date on how bison reintroductions may affect the visitor experience and visitor sense of place, especially at grassland protected areas. This research explores the ways in which bison, as a charismatic species, connect people to grassland landscapes and shape their experiences at the Rocky Mountain Arsenal, an urban National Wildlife Refuge located fifteen minutes from downtown Denver. These findings have important implications for linking urban audiences to grasslands, one of the world's most endangered landscapes, and engaging these publics in grassland conservation actions. In this way, this research answers a question with practical and theoretical significance for bison conservation and grassland recovery in the contemporary West. It also provides important insights about the socio-demographics of the Refuge's contemporary visitor base, and how refuge visitors recreate in and value this unique grassland protected area. Ultimately, these data will help Refuge managers understand their 21st century visitor publics and what role the Refuge's conservation bison play in attracting and connecting visitors to this grassland. This project could not have happened without the support and partnership of the Rocky Mountain Arsenal National Wildlife Refuge staff, and we thank them for their numerous contributions.

Report Structure

This project report is structured into five sections. Project Background, Objectives and Contributions sets the stage for understanding the broader context for this project, its main objectives and the research site, the Rocky Mountain Arsenal National Wildlife Refuge and its bison herd. Here, we also describe how this study deepens the discussion about visitor management, the value of the RMA bison herd, and grassland conservation. The next section, Methods, details the study design and how its 111 visitor-intercept interviews were carried out. The fourth section, Study Results, presents findings from the visitor-intercept interviews, including visitor socio-demographic information, visitor motivations, self-reported recreation patterns, site experiences, and place attachment to the refuge and its bison herd. The concluding section of this report, Discussion and Recommendations, consists of a summary of the key findings about visitors' experiences with the Rocky Mountain Arsenal National Wildlife Refuge and its bison, as well as recommendations for refuge managers on visitor infrastructure development, and community engagement programming.



Project Background and Importance

Study Site: The Rocky Mountain Arsenal National Wildlife Refuge – A Protected Urban Grassland under Restoration

The Rocky Mountain Arsenal National Wildlife Refuge encompasses 16,000 acres of historic shortgrass prairie at the eastern edge of metropolitan Denver. The site is an urban refuge, located only eight miles from downtown Denver and within an hour's drive for the more than 3 million residents of the Denver-Boulder Metropolitan Statistical Area. It provides wildlife habitat for more than 350 species including bald eagles, white-tailed and mule deer, burrowing owls, black-footed ferrets, grassland birds and plains bison (USFWS 2015). The Refuge also an important ambassador site for connecting urban publics to Western grassland conservation and bison recovery.

The Refuge has a history as an industrial, military and agricultural landscape. In 1942, the U.S. Army purchased nearly 20,000 acres of homesteaded agricultural lands from private landowners along the western edge of Colorado's High Plains to build the Rocky Mountain Arsenal, a chemical and munitions plant. The Arsenal manufactured chemical weapons and bombs during WWII, the Cold War and the Korean War. Shell Oil Company later leased the site for agro-chemical manufacturing. The intensive chemical production at the Arsenal contaminated lands within and around its boundaries (USFWS 2015). Some of the environmental waste from the Arsenal was disposed of through deep well injections, and other outdated practices, which had negative effects on the site and on residents of the historically underserved communities living adjacent. During its tenure, the military also replanted the site with crested wheatgrass, a non-native grass species, for soil stabilization. The site became a monoculture of crested wheatgrass with little value as wildlife habitat. The Environmental Protection Agency placed the Rocky Mountain Arsenal on its National Priority List in 1987 and the Arsenal had to undergo extensive environmental remediation (Federal Register 1987). After substantial cleanup by the EPA, DOI, Agency for Toxic Substances and Disease Registry, the State of Colorado, and the U.S. Army, Congress passed the Rocky Mountain Arsenal National Wildlife Refuge Act in 1992. The Act transferred management of the lands to the U.S. Fish and Wildlife Service for grassland restoration and wildlife conservation, but only after the U.S. Army completed clean-up efforts to guarantee human and wildlife safety (USFWS 2015).

On April 21, 2004, the Rocky Mountain Arsenal National Wildlife Refuge was formally established on approximately 5,000 acres of former Army land. The Refuge has continued to grow in size over the past decade and now encompasses 15,000 acres of historic shortgrass prairie, which the Refuge is actively restoring to its native condition.

Bison Conservation at the Refuge

In March 2007, as part of its prairie restoration program, the USFWS introduced sixteen Montana bison to the Refuge. Bison are central to recovering and sustaining the health of North America's grasslands; their grazing, wallowing and horning behaviors help maintain grassland structure, function and species diversity (Freese et al. 2007, Gates et al. 2010). These bison quickly became a highly recognizable symbol of the West for travelers into Denver International Airport, who could see the bison herd from the air. The Refuge bison herd currently numbers 60 individuals, but the U.S. Fish and Wildlife Service Comprehensive Conservation Plan for the RMA outlines plans to add acreage to the bison pasture in the coming years. The USFWS could potentially increase the size of the bison pasture to more than 12,000 acres, which could support a herd of 100 to 200 bison thundering across the prairie (USFWS 2015).



Project Objectives

This study has the following three objectives:

- Study Objective 1: Document how Refuge's conservation bison herd shapes the visitor experience and visitor place attachment.
- Study Objective 2: Produce key information for Refuge managers about visitor demographics, use patterns and site experiences to inform Refuge management, community engagement strategies and meaningful visitor infrastructure development.
- Study Objective 3: Through partnership-building, advance large-scale and collaborative bison conservation along the mountain-plains interface of Colorado and New Mexico, one of Denver Zoo's focal conservation landscape.

Building on Previous Visitor Studies

The current study builds on two previous visitor studies completed at the Refuge: the *National Wildlife Refuge Visitor Survey at the Rocky Mountain Arsenal National Wildlife Refuge* (Dietsch et al. 2013) and *Understanding Urban Audiences: Community Workshop Results for the Rocky Mountain Arsenal National Wildlife Refuge* (Sexton et al. 2015).

The Rocky Mountain Arsenal National Wildlife Refuge was one of 25 refuges in the NWR system selected as a site for the 2012 Refuge Visitor Survey. U.S. Geological Survey researched developed the survey instrument, using Dillman survey design methods, in consultation with USFWS Headquarters staff. The survey was administered to adult visitors at the Refuge over two separate 15-day sampling periods. A total of 320 visitors were surveyed. This survey asked participants to describe how they had first heard of the RMA, their reason for visiting on that day, their place of residence, group size, mode of transportation, recreational activities, satisfaction and opinion on RMA features, and answer several demographic questions. Survey results showed that 99% of visitors to the RMA were U.S. residents; 95% were white; 48% were male and 52% female, and the average visitor was 50 years old with a college education. Overall, survey respondents were highly satisfied with RMA services and facilities and expressed high levels of personal concern about wildlife and wild landscapes, particularly in the context of climate change threats.

The second and more recent visitor study, *Understanding Urban Audiences: Community Workshop Results for the Rocky Mountain Arsenal National Wildlife Refuge*, was conducted from 2013-2014 as part of the nascent USFWS Urban Wildlife Conservation Program (Sexton et al. 2015, Dietsch et al. 2013). In response to the 2011 strategy document *Conserving the Future: Wildlife Refuges and the Next Generation*, the U.S. Fish and Wildlife Service created an Urban Wildlife Refuge Initiative. The goal of this Initiative is to increase relevance of refuges to urban audiences as well as diversify and expand the USFWS constituency. In pursuit of this vision and to identify potential barriers to public engagement, the USFWS Human Dimensions Branch joined with the U.S. Geological Survey and North Carolina State University to conduct research with urban populations at select refuges in the system. Along with a literature review and interviews with refuge staff and partner organizations, project researchers organized community workshops to identify challenges, and brainstorm strategies for increasing engagement with diverse urban publics.

The Rocky Mountain Arsenal National Wildlife Refuge was one of 7 urban refuges (of 301 refuges system-wide) selected as a site for workshops with community leaders to understand the benefits, barriers and strategies to better connect and engage urban residents (Sexton et al. 2015). Researchers conducted workshops with twelve community leaders in September 2013 and March 2014. To stimulate discussion, researchers prompted participants with four questions related to outdoor recreation and engagement; notes from the workshop were synthesized into key themes and qualitatively analyzed.



Workshop participants identified three major barriers to engagement with outdoor recreation opportunities at the RMA: 1) Lack of knowledge/awareness of outdoor recreation opportunities in general and of what the refuge has to offer; 2) Perceptions about the refuge due to its history and 3) Feeling unwelcome in the outdoors and at RMA (e.g. fence, gates, particular staff) (Sexton et al. 2015, 4). Workshop participants also identified three major strategies to increase engagement with public audiences: 1) Increase access to the refuge through a variety of means, 2) Strengthen marketing and outreach efforts; 3) Improve cultural diversity and sensitivity of staff and volunteers (Sexton et al. 2015, 6).

The current study broadens and deepens the information presented in these two studies. It provides an updated socio-demographic profile of Refuge visitors and newer information on visitor motivations, preferred recreational activities, and the ways the conservation bison herd is shaping the visitor experience. This more specific dataset is important for RMA managers because it helps to develop a more precise and longitudinal picture of who visits the RMA, why they visit, and how they experience the refuge and its conservation bison herd. This conservation social science data contributes to a more in-depth and integrative socio-ecological understanding of the RMA as a natural and social space. It also equips managers with key insights on how bison may attract contemporary visitors to this site to inform visitor infrastructure development and community programming. This information can help managers develop science-based strategies to better engage the public in visiting and supporting the Rocky Mountain Arsenal National Wildlife Refuge, a protected grassland in a major urban area.

Study Value: Understanding Urban Audiences for Grassland Conservation and Bison Recovery in the New West

The American West is a rapidly changing social region. Population growth, amenity migration and urbanization are reshaping Western landscapes and economies, especially in and around attractive urban centers. This “New West” is characterized by a diversifying economy concentrated in the professional services sector, population growth through in-migration, and urbanization. These processes of demographic and social change are driven in large part by amenity migration: people from other parts of the United States are moving to Western regions and cities that offer access to plentiful open space and cultural amenities while still providing airline travel to broader markets (Rasker et al. 2009, Rasker 2012, Rasker, Gude and Delorey 2013, Wilkinson 2013).

Colorado’s Front Range, including metropolitan Denver, is attracting many of the New West’s amenity migrants, who seek to relocate for quality of life. The State Office of Demography estimated that Colorado’s population had reached 5.35 million as of July 2015 (Colorado State Demography Office 2014), and University of Colorado-Boulder researchers summarized that Colorado’s population is the 4th fastest growing in the country by percentage (Wobbekind and Lewandowski 2015). By 2050, more than 8 million people are expected to call Colorado home – an increase of more than 3 million people (Garner 2015). In addition, three out of four people are moving to Colorado’s urban areas, mostly to the nine counties of the Front Range. These counties account for 80% of the jobs in the state (Svaldi 2015) and approximately 50% of the visitation to the Rocky Mountain Arsenal National Wildlife Refuge (*this study*).

These amenity migration trends are reshaping metropolitan Denver – defined as the seven county Scientific and Cultural Facilities District (SCFD): Adams, Arapahoe, Broomfield, Boulder, Douglas, Jefferson and Denver. Denver is America’s 6th fastest growing city (Carlyle 2014) and the Denver-Boulder metro area is predicted see the largest influx of new residents, with an increase of more than 1 million people predicted by 2040 (Colorado State Demography Office 2015).

Metropolitan Denver’s demographic transition poses key questions for open space preservation and wildlife management – as diverse residents from elsewhere, drawn by Front Range amenities, move into the seven county region. These new residents may have a more limited history with, knowledge about and



attachment to Colorado's open space networks, including the Rocky Mountain Arsenal National Wildlife Refuge. In addition, many new residents are drawn to the region's picturesque mountains and numerous alpine recreational activities; they often don't recognize the grasslands to the east as valuable natural landscapes too. Protected area managers and conservationists need to understand these new urban audiences, and track how these demographic trends are affecting the ways that these diverse publics value, use and want to engage with regional open space networks, including grassland protected areas. Such audience analyses will be critical to ensuring that regional grassland conservation work and bison recovery remains relevant into the future.

This research provides foundational data about the visitors and visitor experiences at the Rocky Mountain Arsenal National Wildlife Refuge so that refuge managers and conservation partners can better understand the current social landscape for bison conservation and grassland protected area management in metropolitan Denver, a region of rapid demographic growth and change, and apply study insights to improving community engagement in regional bison conservation. These insights help ensure a stronger future for protecting grasslands, one of the world's most endangered landscapes, and recovering bison, one of the most important focal species for grassland health.

Methods

Research Design

To achieve these project objectives, the research team conducted 100 structured visitor-intercept interviews at the Refuge during the summer of 2015. Refuge visitors were asked about their visit motivations, experiences at the Rocky Mountain Arsenal National Wildlife Refuge, and their perceptions of the Refuge bison herd. Interviews typically lasted 5-10 minutes. Interviews were strategically conducted at the highest visitor volume location, outside the visitor center, which was determined through pilot research. Researchers used a 44-item questionnaire containing open and close-ended questions and a place attachment scale based on Folmer et al. (2013). The place attachment scale and demographics questions were self-administered. Interviews were conducted using iPads and the cloud-based data collection software, iSurvey. The researchers pre-tested the interview guide at the Refuge in June 2015, and refined it accordingly.

The interview guide was broadly organized into three sections. The first section elicited details from visitors about their experience at the refuge, including frequency of visitation, recreational activity, reported visit location(s) in the refuge, motivation for visiting the refuge, and other related questions. The second section delved deeper into visitors' sense of connection to and appreciation for the refuge, asking visitors whether the refuge was important to them, why it was important, and what words they would use to describe the refuge. This section also contained a series of five-point Likert-scale questions addressing place attachment, or how connected a visitor feels to a site. Respondents filled out these scale questions independently. Finally, the interview guide concluded with a section about visitors' demographics and other questions such as whether they had visited any parks in the Denver Mountain Parks system, which also houses two conservation bison herds. This section of the interview was self-administered. All visitor responses and characteristics were analyzed in the aggregate using descriptive statistics and qualitative coding techniques.



Sampling Strategy

Three weeks of data collection occurred on site from July through September, 2015. The study design employed multi-stage random sampling to determine dates, days and times of data collection at each site. In order to construct a sampling plan that was as representative of the visitor population as possible, the research team sampled based on the random selection of: 1) 3 weeks within the study period for each site, 2) two weekdays and one weekend day in each designated sampling week, and 3) time of the day for visitor interviews at each of the three sites (either a morning shift (9am-12pm) or afternoon shift (12pm-4pm)). The research team worked a full 9am-4pm shift on weekend days. The one exception to this interview schedule occurred in the third week of interviews, when the targeted 100-person sample was reached by the end of the second weekday of interviews; weekend day interviews were not conducted in that week. Below are the weeks, days, and times of data collection:

Table 1. Study Sampling Design: Multi-Stage Random Sampling to Minimize Visitor Selection Bias

Week	Rocky Mountain Arsenal National Wildlife Refuge
1	Wednesday, July 8, 2015: 12p.m.- 4p.m.
	Friday, July 10, 2015: 9a.m.- 12p.m.
	Sunday, July 12, 2015: 9a.m.- 4p.m.
2	Thursday, August 13, 2015: 9a.m.- 12p.m.
	Friday, August 14, 2015: 9a.m.- 12p.m.
	Saturday, August 15, 2015: 9a.m.- 4p.m.
3	Thursday, August 27, 2015: 9a.m.- 12p.m.
	Friday, August 28, 2015: 12p.m.- 4p.m.



Study Results

Visitor Response Rates

Background

The visitor response rate is defined as the total number (percentage) of visitors who were approached by project researchers and agreed to complete an interview. Response rates are an important indicator of the level of cooperation by a target population and help demonstrate if study data from a sample are representative of the larger target population. Higher response rates (>60%) minimize non-response error (Vaske 2008). A response rate of 70% or higher is considered good for groups of people who share specific characteristics and interests, such as National Park visitors (Salant and Dillman 1994). In fact, a meta-analysis of response rates for mail surveys distributed to visitors at 102 U.S. National Park sites confirmed that the median response rate for park visitors was 79% (Dillman and Carley-Baxter 2000). Work by the National Park Service's Visitor Services Project further estimates that the average response rate for park visitors is 73% (Littlejohn 2010).

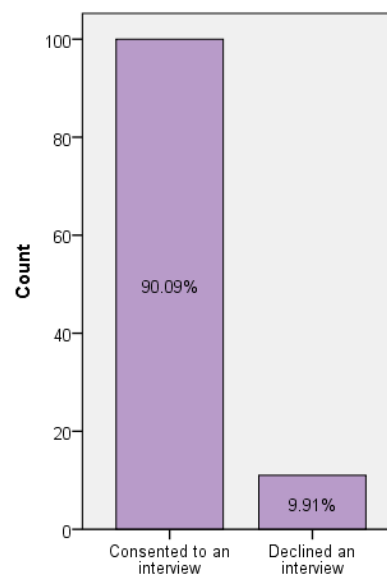
Results

Ninety percent (90%) of intercepted visitors at the Rocky Mountain Arsenal National Wildlife Refuge completed an in-person intercept interview. This response rate is high, and exceeds the average response rate documented in other protected area visitor research (see above).

Figure 1. Visitor Response Rate

Response rate - Rocky Mountain Arsenal National Wildlife Refuge		
	Frequency	Percent
Consented to an interview	100	90.1
Declined an interview	11	9.9
Total	111	100.0

Response rate – Rocky Mountain Arsenal National Wildlife
Refuge





Margin of Error

The margin of error is a statistics that asserts the likelihood that the result from a study sample is close to the number a research would get if he or she queried the whole population (Wikipedia 2017). Assuming a 95% confidence level, this study has a 10% margin of error based on the n=100 sample size (visitors who completed the intercept interview). This means that the true population value for the Refuge visitor population falls within ten percentage points of the observed (sample) mean.¹ For example, this study reports that 27% of observed Refuge visitors were between the ages of 18-35. Thus, for the entire Refuge visitor population, this value falls somewhere between 17% and 37% (27% \pm 10 points).

Non-Response Bias

Concern about non-response bias in this study is mitigated by the very high Refuge visitor response rate. In light of the high response rate (90%) and the very small sample size of non-respondents, non-response bias checks were unnecessary (see Vaske 2008).

Refuge Visitor Characteristics

Background

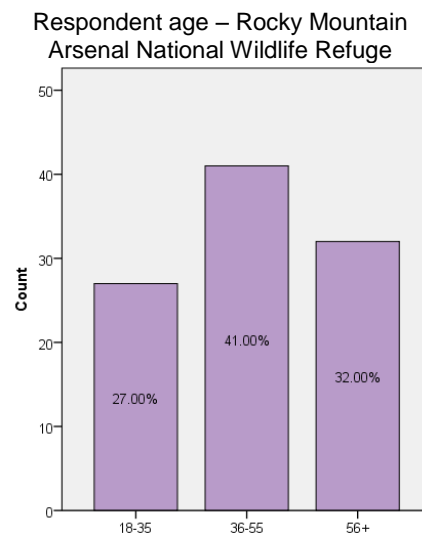
This study documented visitor socio-demographics, the frequency and duration of visits, visitors' place of residence, and how visitors came to know of the RMA.

Socio-Demographics

Age

Visitors were grouped into three age categories: ages 18-35 (millennials), ages 36-55 (Generation Xers), and 56 years of age or older (baby boomers). A visitor to the Refuge is most likely to be a Generation Xers. Gen-Xers are the largest visitor group by age to the Refuge with 41% of respondents reporting their age as between 36-55. The remaining respondents are fairly evening split between millennials and baby boomers.

Respondent age – Rocky Mountain Arsenal National Wildlife Refuge		
	Frequency	Percent
18-35	27	27.0
36-55	41	41.0
56+	32	32.0
Total	100	100.0



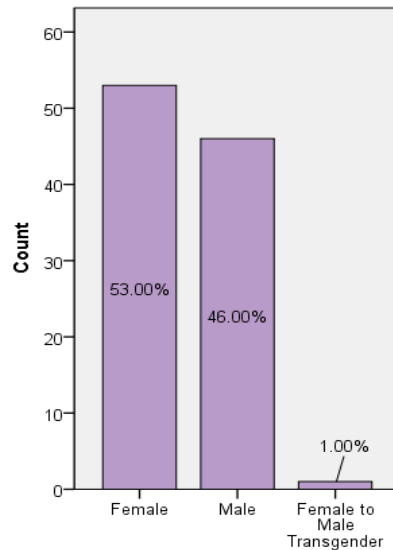
¹Since the total population of visitors to the Refuge in 2015 is not known, it is not possible to calculate sampling error. Thus, margin of error is a preferable statistic.



Gender

Visitors to the Refuge are slightly more likely to be female than male. 53% of intercepted visitors self-identified as female, 46% self-identified as male, and 1% self-identified as female-to-male transgender.

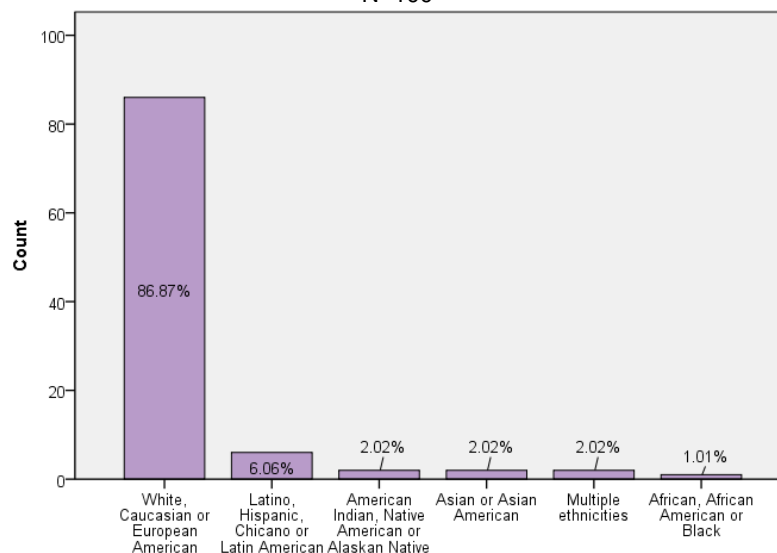
Respondent gender – Rocky Mountain Arsenal
National Wildlife Refuge
n=100



Ethnic Diversity

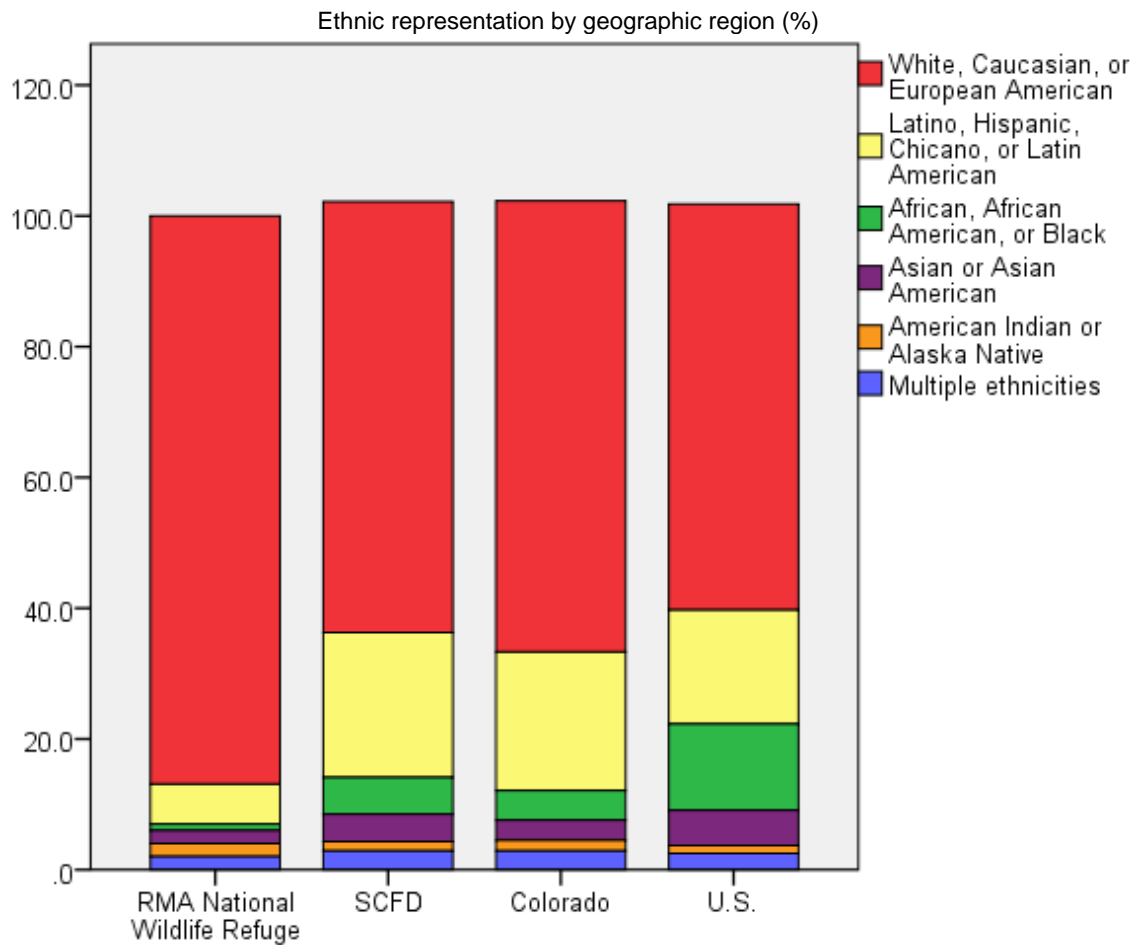
Visitors to the refuge are most likely to be white. Caucasians represented 87% of the sample. Latino respondents constituted 6%; Native American, Asian/Asian American, and respondents of multiple ethnicities each constituted only 2%. 1% of respondents reported they were African, African American or Black.

Respondent ethnicity – Rocky Mountain Arsenal National Wildlife Refuge
N=100





Refuge visitors were less ethnically diverse than the broader SCFD, Colorado, and U.S. populations.

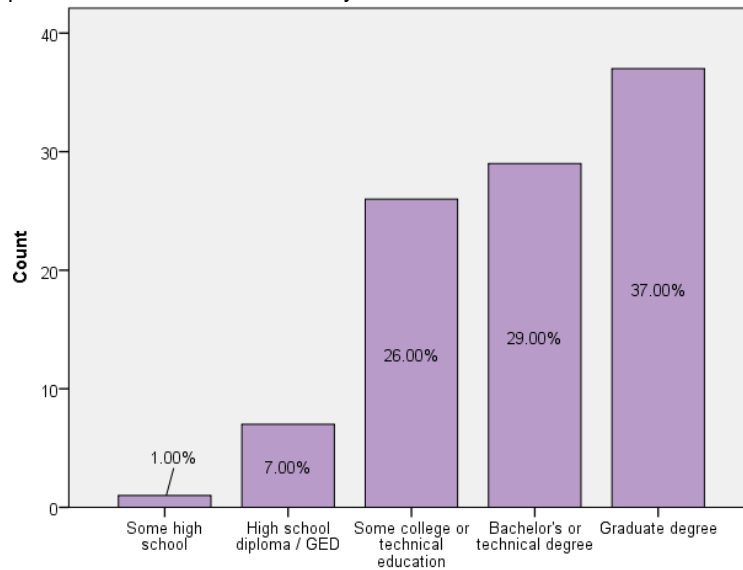




Education Level

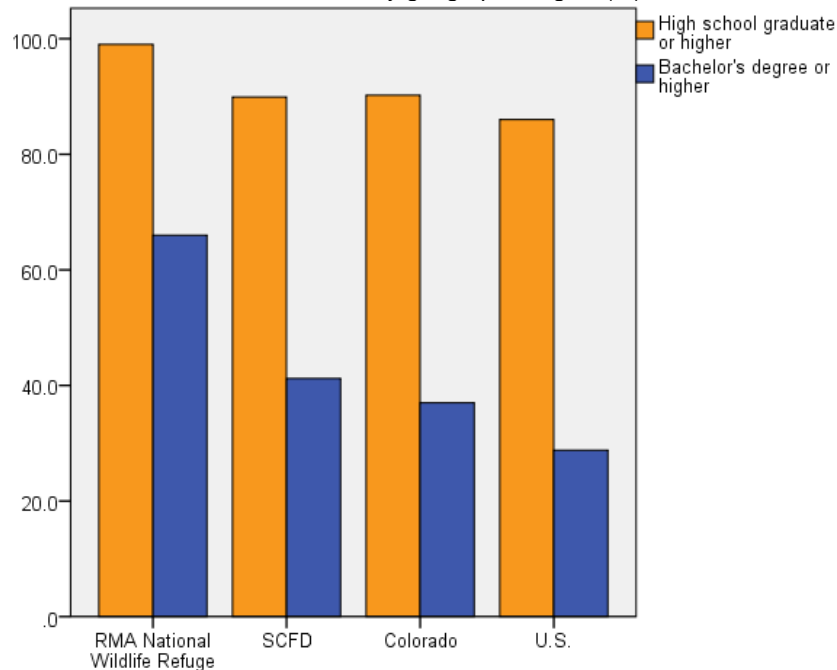
Visitors to the refuge well-educated, with two-thirds of all respondents holding a Bachelor's degree or higher and 37% of respondents holding a graduate degree.

Respondent education level – Rocky Mountain Arsenal National Wildlife Refuge



Refuge visitors reported a higher level of education than the average SCFD, Colorado, or U.S. resident. These numbers track with the trends observed in U.S. National Parks: namely, that park visitors are highly educated with more than 50% holding a bachelor's degree or higher (see Littlejohn 2010).

Education level by geographic region (%)





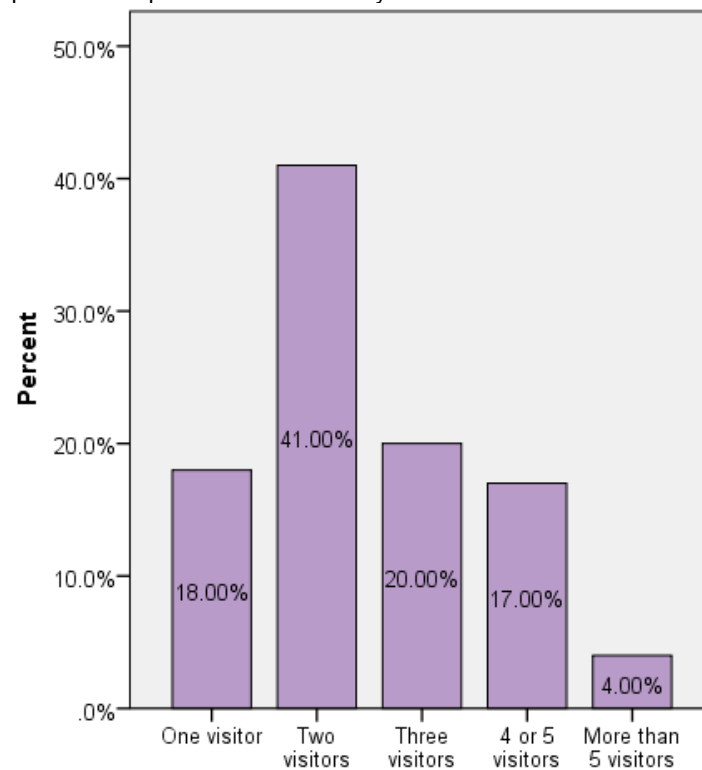
Visitor Group Size and Number of Children

The typical visitor group to the refuge consists of two adults and no children.

Visitor group size – Rocky Mountain Arsenal
National Wildlife Refuge

	N	Minimum	Maximum	Mean	Median
Visitor group size	100	1.00	17.00	2.73	2.00

Visitor group size for respondents at the Rocky Mountain Arsenal National Wildlife Refuge



Number of children in the visitor group – Rocky Mountain Arsenal
National Wildlife Refuge

	N	Minimum	Maximum	Mean	Median ²
Number of children in the visitor group	100	0.00	15.00	0.71	0.00

² For data on visitor group size and number of children in the visitor group, it is appropriate to use the median value rather than the mean or average, so as to mitigate the skew effect of large outliers in the data sets (e.g. one visitor group containing 15 persons, as shown above). Using median values, the typical visitor group to the Refuge comprises 2 adults and no children.

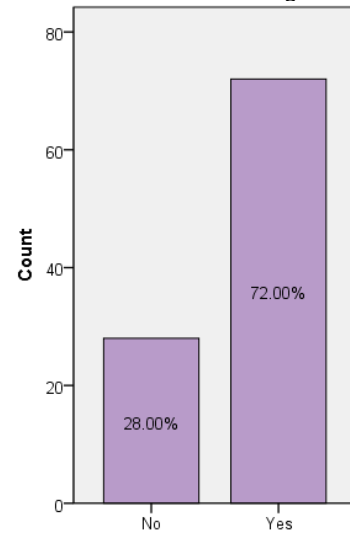


Frequency and Duration of Visitation

First-time visitors are more common at the Refuge than repeat visitors. Nearly three-quarters of respondents were first-time visitors to the Rocky Mountain Arsenal National Wildlife Refuge. Only 28% of respondents had visited the refuge previously. The majority of visitors reported spending an average of two hours or less on-site.

First visit to the Rocky Mountain Arsenal National Wildlife Refuge		
	Frequency	Percent
No	28	28.0
Yes	72	72.0
Total	100	100.0

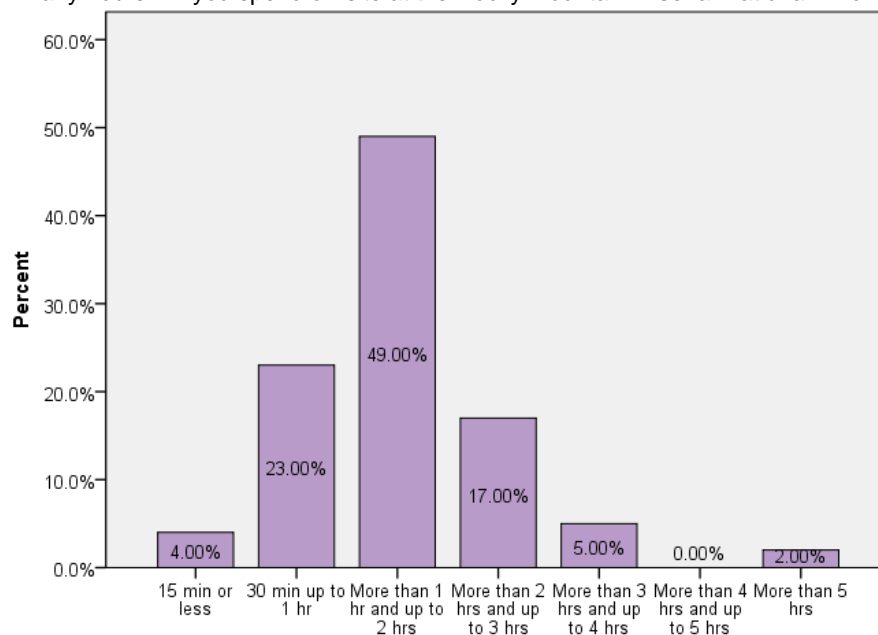
First visit to the Rocky Mountain Arsenal National Wildlife Refuge



Duration of Visit – Rocky Mountain Arsenal National Wildlife Refuge

	Minimum	Maximum	Mean	Median
About how many hours will you spend on-site?	0.00	6.00	1.90	2.00

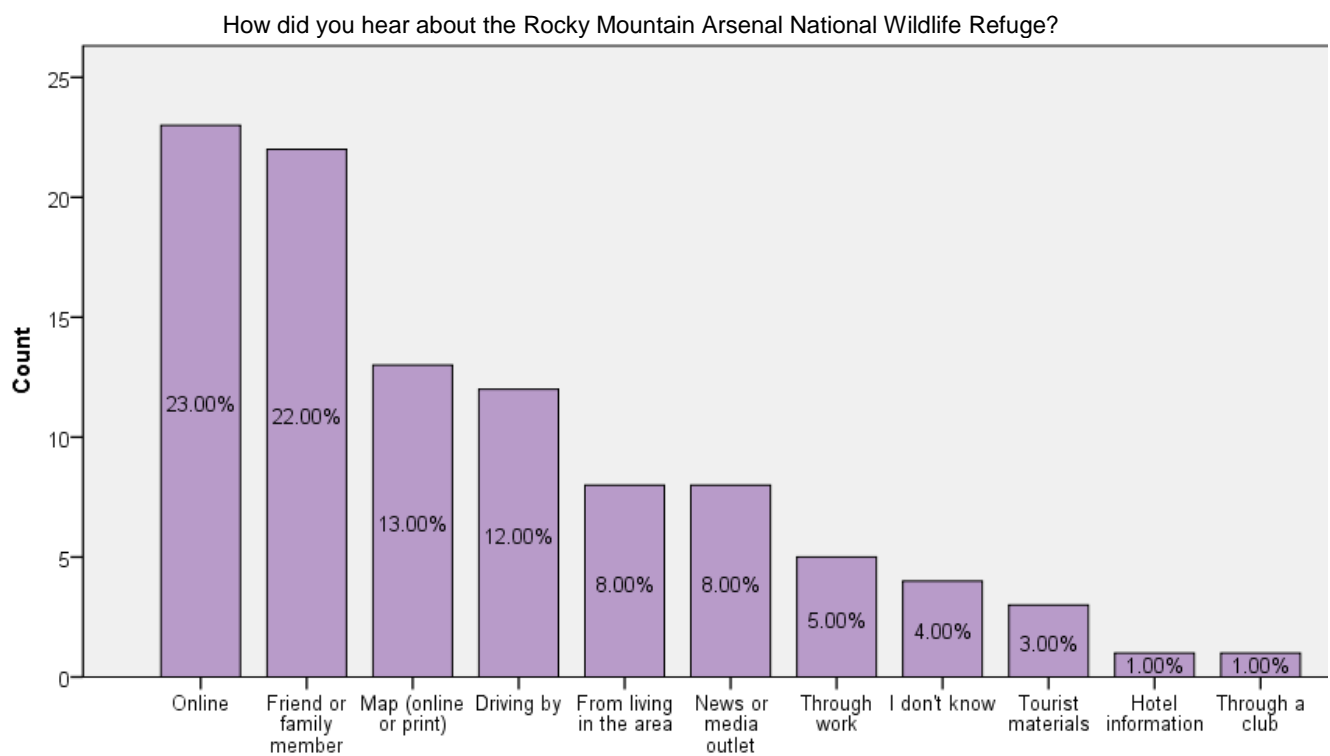
About how many hours will you spend on-site at the Rocky Mountain Arsenal National Wildlife Refuge?





Sources of Information about Refuge

When asked to describe how they first heard about the refuge, respondents were most likely to identify one of two sources. *1 in 5* visitors to the Rocky Mountain Arsenal National Wildlife Refuge had heard about the refuge from an online source (e.g. USFW site, Denver attractions, hiking blog) or a from a friend or family member. *1 in 10* visitors knew about the Refuge from viewing it on a map, or from driving by, often en route to or from Denver International Airport. Other sources included from living in the area (8%), or from a news or media outlet such as the Denver Post or Colorado Public Radio (8%).



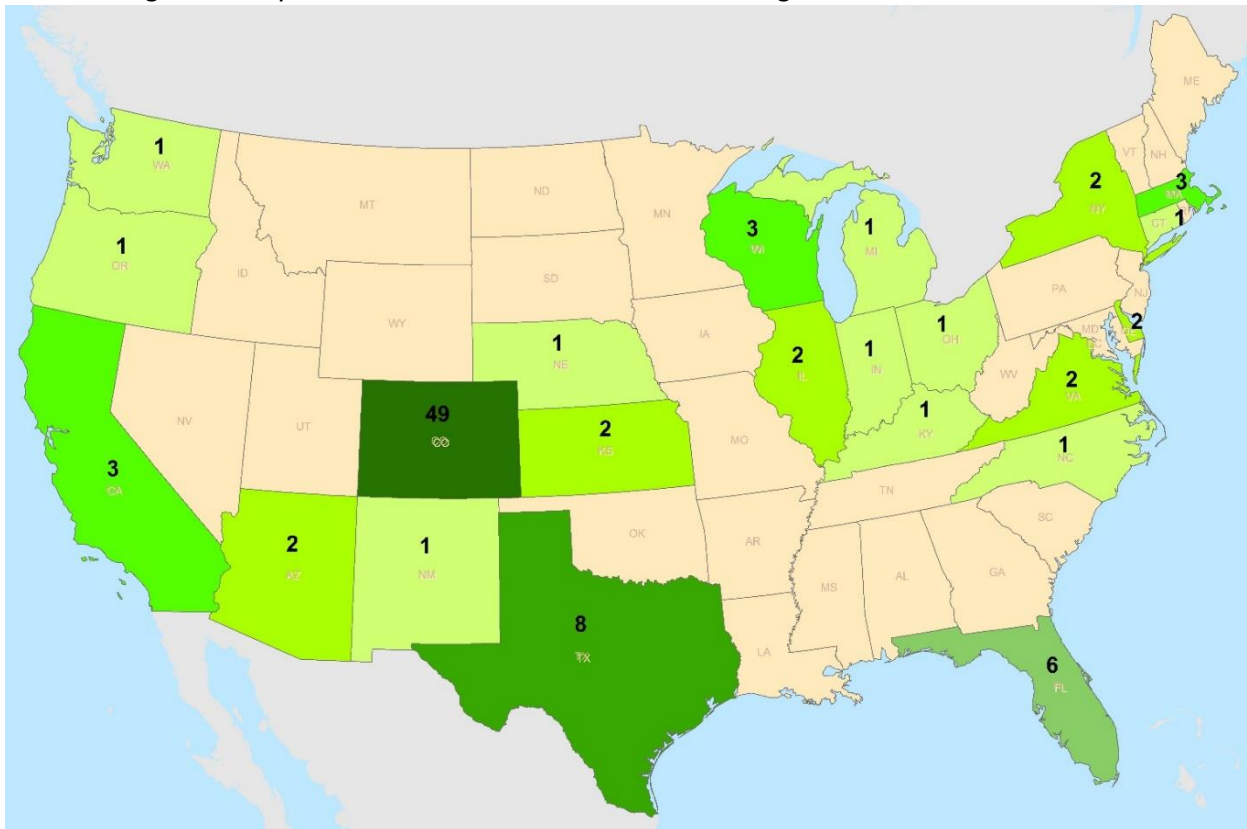


Visitor Origin

Results

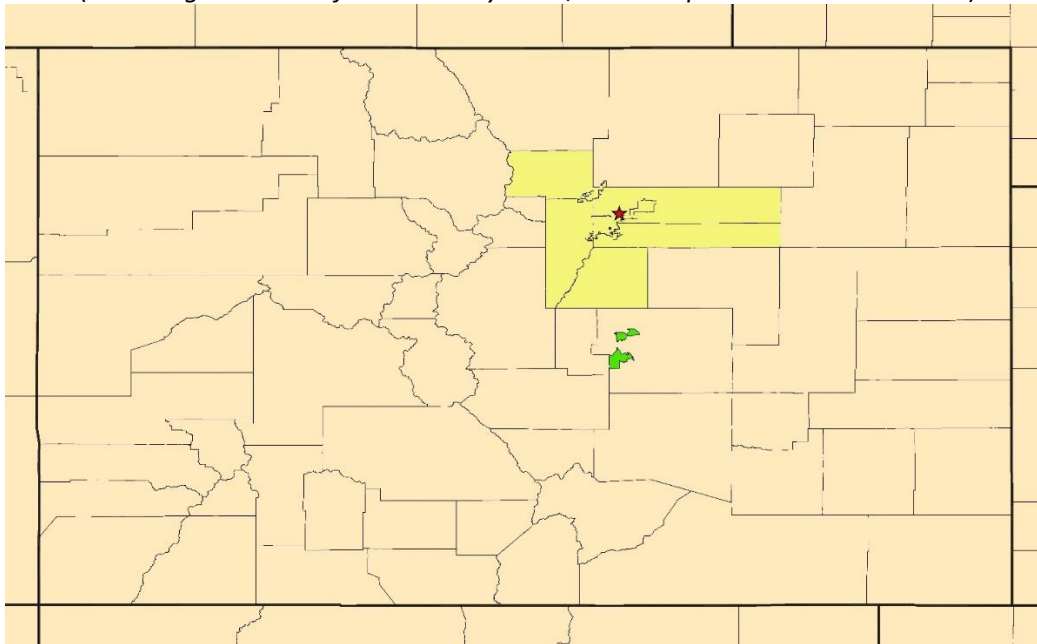
Visitation to the Refuge is almost evenly split between Coloradans, who are typically residents of metropolitan Denver, and out-of-state visitors. Fifty-two percent of intercepted visitors to the Rocky Mountain Arsenal National Wildlife Refuge reside within Colorado, and 92% of these Colorado residents live in the seven-county Scientific and Cultural Facilities District: Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson counties. Forty-eight percent (48%) of intercepted visitors hailed from out-of-state and came from twenty-one different states. Texas and Florida residents were most frequently encountered.

Origin of Rocky Mountain Arsenal National Wildlife Refuge Visitors from within the U.S.



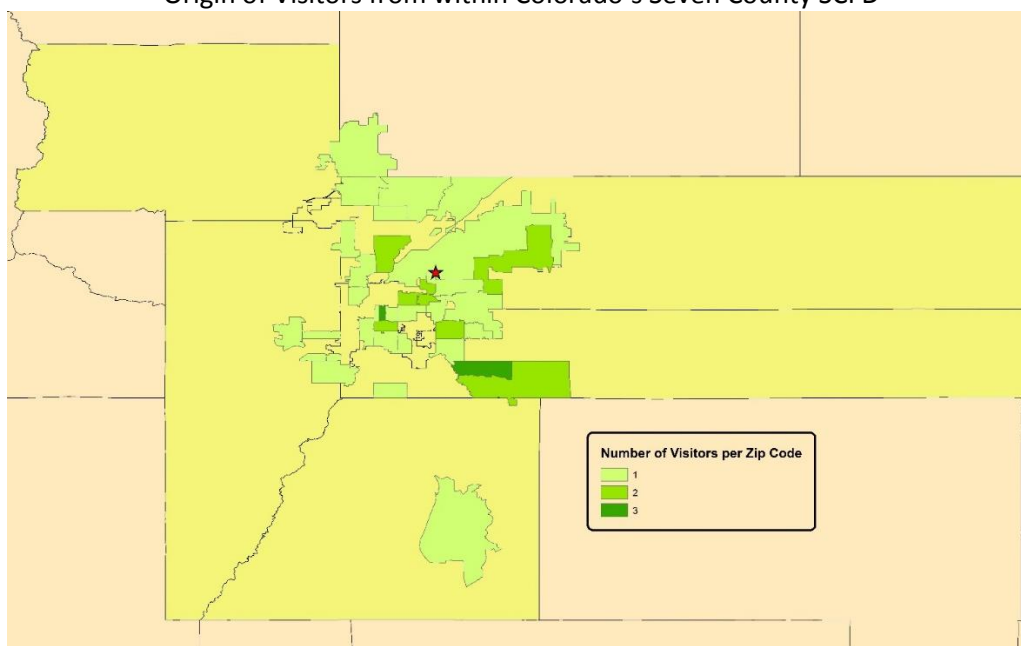


Residence of Rocky Mountain Arsenal National Wildlife Refuge visitors from Colorado but outside of the SCFD
(excluding residents of the 7-county SCFD; SCFD map shown in detail below)



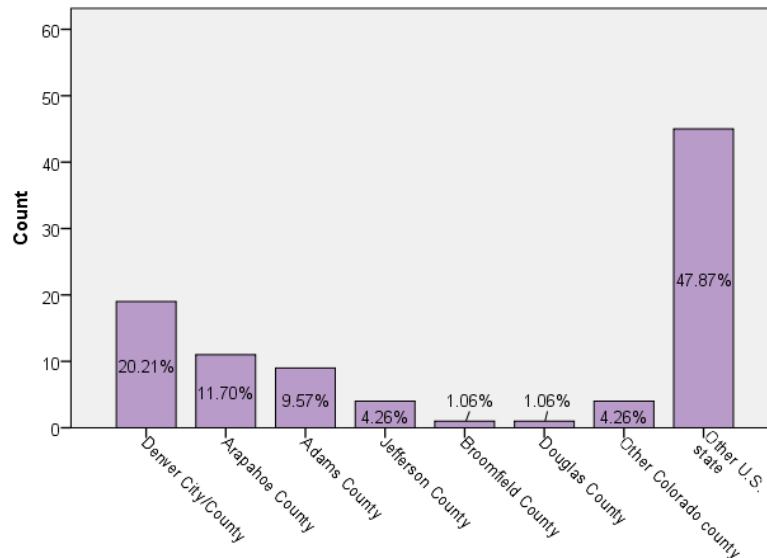
Within the seven-county SCFD, most visitors are residents of the City/County of Denver, followed by Arapahoe, Adams, and Jefferson counties.

Origin of Visitors from within Colorado's Seven County SCFD





Residence of Rocky Mountain Arsenal National Wildlife Refuge respondents (U.S.)
N=94



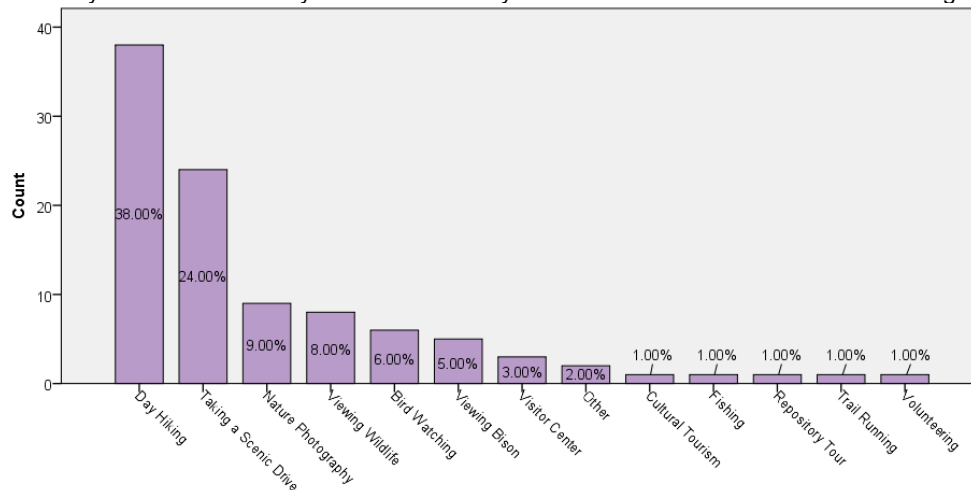
Visitor Recreation Activities and Trends

This section presents results from the two visitor use questions included in the survey instrument: primary recreational activity and primary location(s) for recreation. These data identify respondents' preferred activities within the refuge as well as the most popular self-reported sites for visitation at the refuge.

Recreation Activity

Day hiking and taking a scenic drive are the two most popular primary recreation activities for visitors to the Refuge. Nature Photography, Viewing Wildlife, Bird Watching, and Viewing Bison were also moderately popular recreational activities with refuge visitors. A few respondents also identified exploring the Visitor Center as their primary recreational activity, particularly visitor groups with children who enjoyed playing in the Discovery Center.

Primary recreational activity while at the Rocky Mountain Arsenal National Wildlife Refuge

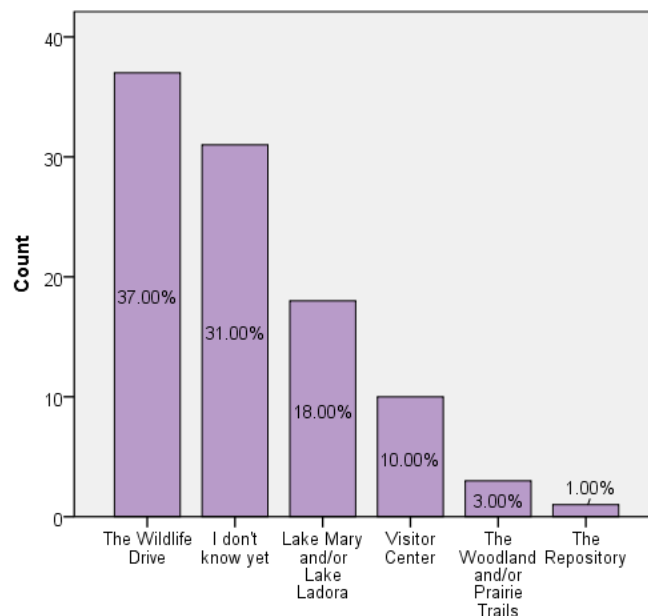




Primary Area of Recreation within the Refuge

The Wildlife Drive is the primary recreation destination for 37% of visitors, followed by Lake Mary or Lake Ladora (18% of visitors). One-third of visitors did not know where they would recreate. Their indecision is likely due to their status as first-time visitors and their unfamiliarity with the Refuge. Most visitors would initially stop at the Visitor Center to learn more about the Refuge even if this was not their primary recreation destination.

Primary Area of Recreation while at the Rocky Mountain Arsenal National Wildlife Refuge
N=100



Refuge Meaning and Importance

This section presents visitor perspectives on the importance of the Refuge and how visitors described the Refuge.

Interviewers first asked visitors: **“What words would you use to describe the refuge?”** The most frequently used word by respondents to describe the refuge was *peaceful*. The next most frequently cited words were descriptors of place: *open*, *beautiful* and *prairie*. An analysis of key themes across visitor responses shows that visitor descriptions were focused around six topics: the refuge as an important and valuable open space, as a distinct prairie, as a home for wildlife, as a positive, close and attractive place, and as offering a high quality visitor center.

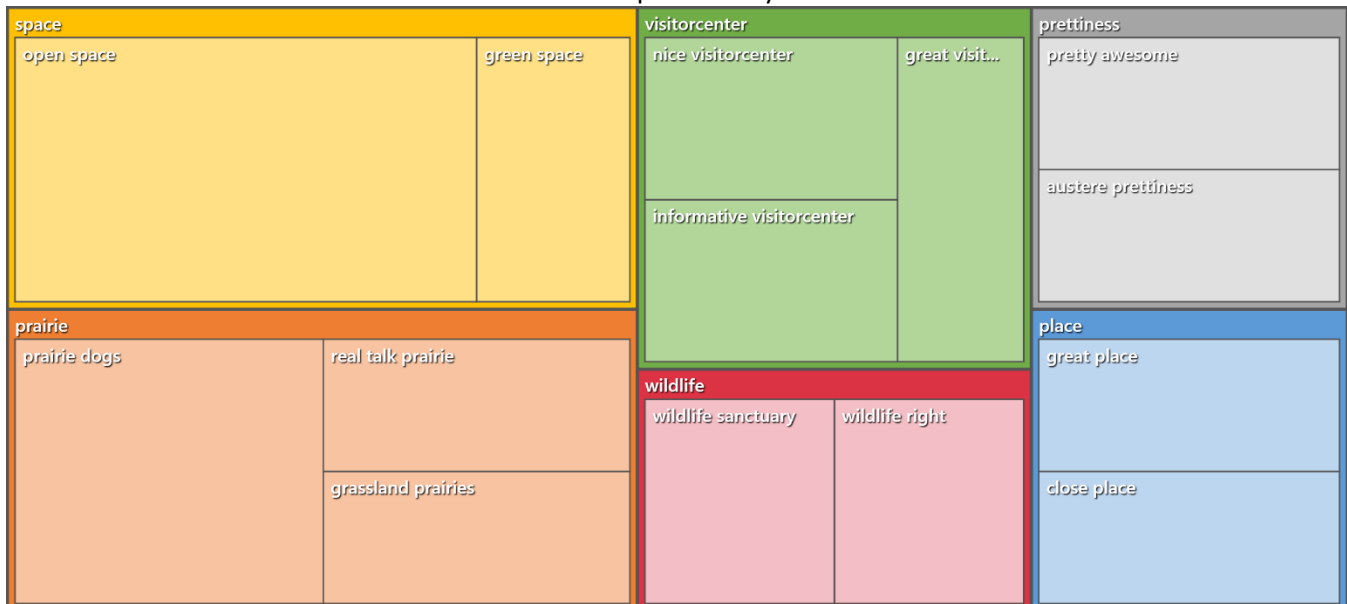


Words Most Frequently Used to Describe the Refuge

Word	Count
peaceful	15
open	14
beautiful	11
prairie	10
close	8
flat	7
nice	7
pretty	7
good	6
nature	6
Visitor center	6
amazing	5
animals	5
big	5
interesting	5



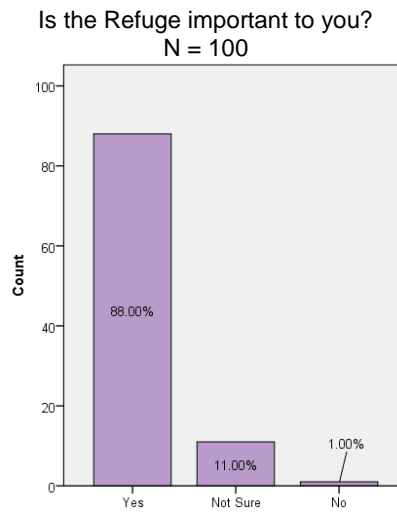
Visitor Descriptions - Key Themes





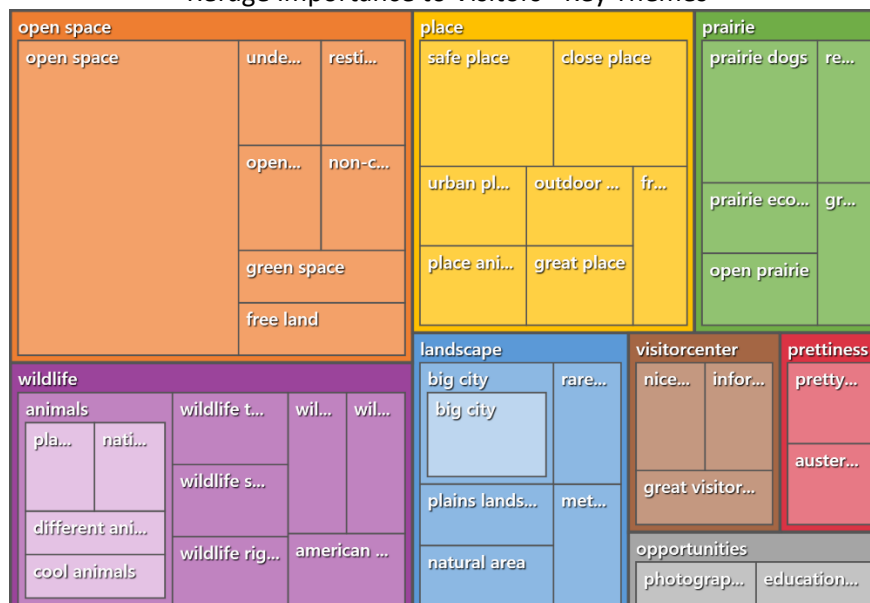
Refuge Importance

When asked *“Is the refuge important to you?”* nearly 9 in 10 respondents stated that the refuge was important to them. Many visitors elaborated and told the research team that the wildlife refuge system and refuges generally are generally important to them. Thus, the RMA was important to visitors as one of the open spaces in the broader U.S. National Wildlife Refuge system.



Visitors were then asked to explain: *“Why is the refuge important to you?”* Visitors discussed several main ways in which the Refuge was important to them. These themes had some overlap with how visitors described the Refuge. Visitors talked about the Refuge as a valuable open space, as an important home and habitat for interesting wildlife, as a close, unique and positive place located where the prairie and the city meet, and as a place to experience and learn about the prairie.

Refuge Importance to Visitors - Key Themes





Place Attachment

Place attachment is a way of measuring and understanding how connected visitors feel to a protected area. Place attachment is a valuable concept in park management because strong place attachment has been linked to an increased willingness among people to steward and seek repeat experiences at protected areas. To measure this construct, the research team used an established place attachment scale developed by Folmer et al. (2013).

Scale Results

Visitors were asked to rate their level of agreement with six Likert items (statements) designed to measure place attachment. Visitors to the refuge exhibited a strong sense of connection to the refuge. Visitors overall mean place attachment scale score was 4.15 (where 4=Agree and 5=Strongly Agree).

Place Attachment Scale – Rocky Mountain Arsenal National Wildlife Refuge			
	Mean	Std. Deviation	α
Place attachment scale (n=99)	4.15	0.58	0.86
I feel very attached to the Rocky Mountain Arsenal National Wildlife Refuge	3.77		
The Refuge means a lot to me	4.05		
I feel at home in the Refuge	4.01		
I would like to spend more time in grasslands like the Refuge	4.27		
Bison are an important part of the visitor experience at the Refuge	4.48		
Bison make me feel more attached to the Refuge	4.31		

1 = Strongly Disagree; 2 = Disagree; 3 = No Opinion; 4 = Agree; 5 = Strongly Agree

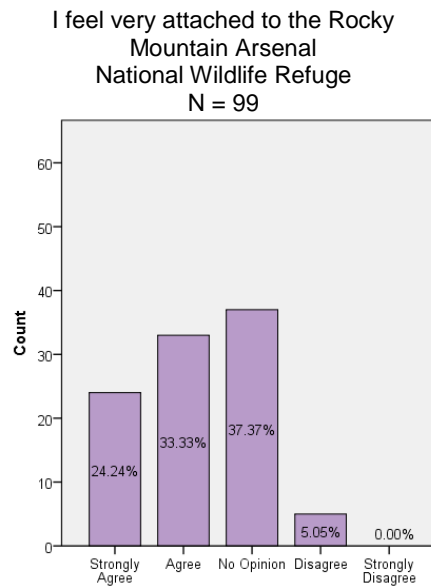
The place attachment scale was tested for reliability using the Cronbach's alpha test. It returned a Cronbach's alpha value of more than 0.70, which is considered to be the threshold for reliability (Vaske 2008). Thus, this scale is a reliable measure of the construct, place attachment, for this study.



Likert Item Results

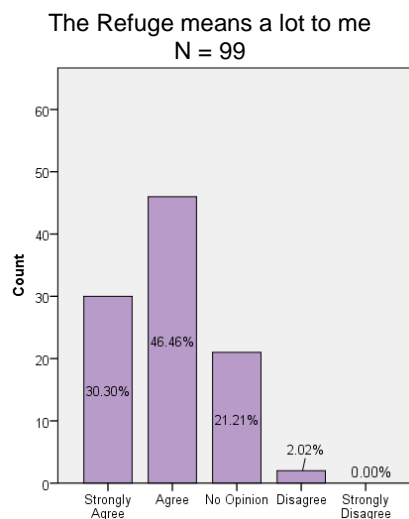
"I feel very attached to the refuge."

Nearly 60% of respondents agreed or strongly agreed that they feel very attached to the refuge. However, the percentage of respondents who noted that they had no opinion on their attachment to the refuge was 37%, which is greater than the Agree and Strongly Agree categories when viewed individually. This means visitors expressed some ambivalence about this statement.



"The Refuge means a lot to me."

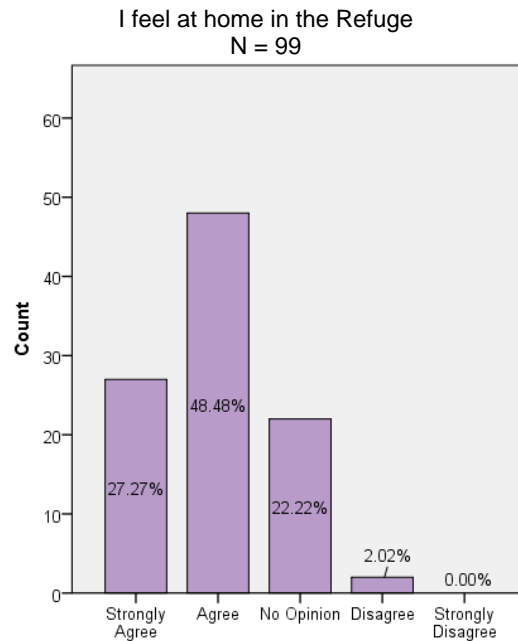
More than 7 out of 10 respondents agreed or strongly agreed the refuge means a lot to them. 1 in 5 respondents had no opinion.





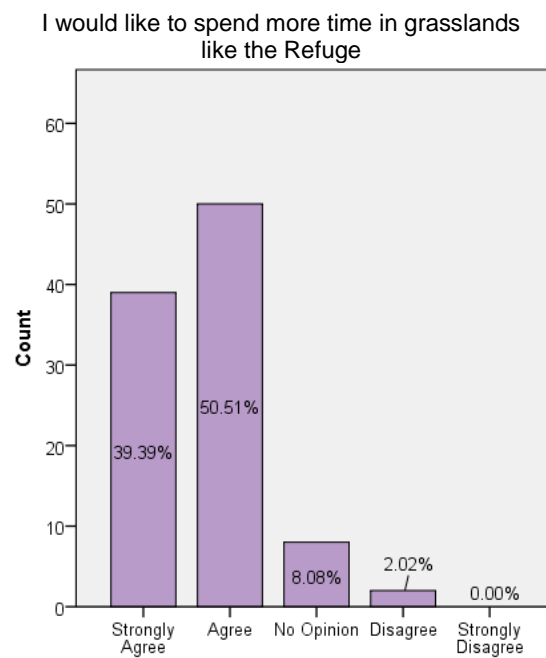
"I feel at home in the refuge."

More than three-quarters of respondents agreed or strongly agreed that they feel at home in the refuge. 22% had no opinion.



"I would like to spend more time in grasslands like the refuge."

9 out of 10 respondents agreed or strongly agreed that they would like to spend more time in grasslands like the Rocky Mountain Arsenal National Wildlife Refuge. 1 in 10 visitors had no opinion or disagreed.





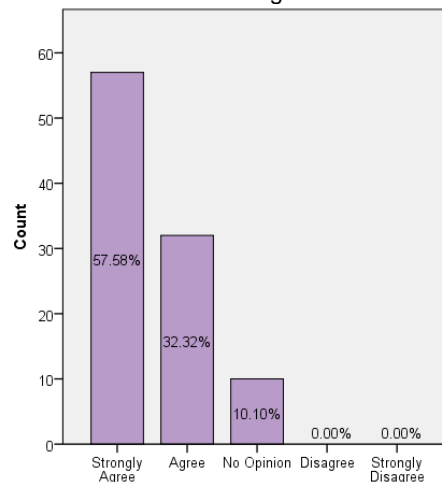
The Role of Bison in Shaping the Visitor Experience

A key objective of this study was to explore and understand what role bison play in shaping the visitor experience at grassland protected areas. These data were collected through two Likert scale items about the importance of bison, which were added onto Folmer et al. (2013)'s place attachment scale. In addition, the researchers posed a series of open-ended questions to those respondents who had mentioned bison as a key reason for visiting the refuge to better understand their interest in and knowledge about the Refuge bison.

Results

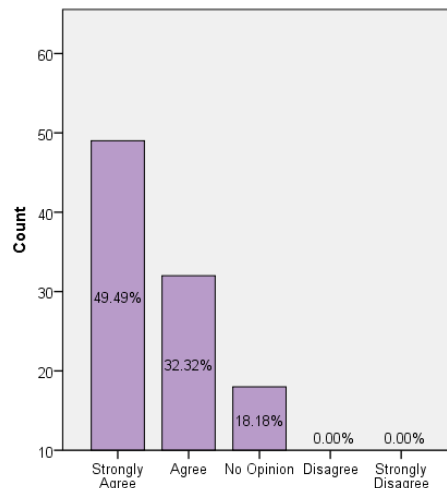
Nearly 1 in 5 respondents mentioned bison when asked about their reason for visiting the Refuge. 9 in 10 respondents agreed or strongly agreed that bison are an important part of the visitor experience at the Rocky Mountain Arsenal National Wildlife Refuge.

Bison are an important part of the visitor experience at the refuge



More than 80% (8 in 10) of respondents agreed that bison contribute to their personal connection to the refuge.

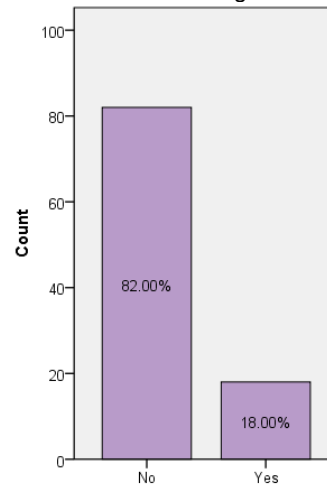
Bison make me feel more attached to the Refuge





1 in 5 visitors described the bison herd as a motivation for visiting the refuge.

Did the respondent mention bison when prompted about their motivation for visiting the refuge?





Visitor Comments on Bison and the Visitor Experience

Park visitors who identified bison as a primary motivation for visiting the Refuge were asked five follow-up questions to assess their interest in and knowledge about these bison. These narrative data, while from a small number of visitors (n=18), do provide important insights into how Refuge visitors see and understand these bison.

Question 1: Why do you want to see the refuge bison herd?

Visitors explained that they wanted to see the bison at the Refuge because “Bison are cool/amazing/awesome.” Other common responses reflected visitors’ interest in the historic relevance of bison as a species, their uniqueness, their large size, or that they had brought a friend or family member to experience seeing bison on the Western plains.

Specifically, why do you want to see the Refuge's bison herd?		
Rocky Mountain Arsenal respondents (n=18)	Frequency	Percent of respondents
Bison are cool/amazing/awesome	5	27.8
Bison are big	4	22.2
Bison are an historic symbol	3	16.7
Bison are unique	3	16.7
I like bison	3	16.7
I want my friend/family member to see bison	2	11.1
Bison are a wildlife symbol	1	5.6
Bison belong in this environment	1	5.6
I enjoy watching bison behavior	1	5.6
I just want to see them	1	5.6
I like animals	1	5.6
It is a beautiful day to come visit	1	5.6
It is a unique experience	1	5.6
It is close by	1	5.6
You can drive through	1	5.6
Total	29	



Question 2: How did you hear about the bison herd?

The most common way that visitors interested in the bison found out about the Refuge's bison herd was from a friend or family member (30%). Other common sources of knowledge included online sources, tourist materials (e.g. from a hotel, airport, or information center), and the Visitor Center itself.

How did you hear about the bison herd?		
Rocky Mountain Arsenal respondents (n=18)	Frequency	Percent of respondents
Friend or family member	5	27.8
Online	3	16.7
Tourist materials	2	11.1
Visitor Center	2	11.1
Driving by	1	5.6
From living in the area	1	5.6
Fish and Wildlife pamphlet	1	5.6
News or media outlet	1	5.6
Through work	1	5.6
I don't know	1	5.6
Total	18	

Question 3: What do you know about these bison?

A majority of respondents (almost 7 in 10 visitors) stated that they knew little to nothing about the Refuge's bison. 11% of visitors mentioned that the herd is reproducing and growing. A handful of visitors shared knowledge about the culling of the Refuge bison, the date of the bison reintroduction and the herd's genetics. A small number of other visitors offered facts about bison generally, such as how they nearly went extinct due to excessive hunting. In summary, visitors did not know a lot about this herd's origin, ownership, or importance.

What do you know about these bison?		
Rocky Mountain Arsenal respondents (n=18)	Frequency	Percent of respondents
I don't know much/anything about these bison	12	66.7
These bison are reproducing and multiplying	2	11.1
Some of these bison have to be culled each year	1	5.6
These bison were brought here in 2007	1	5.6
These bison are a pure strain from Montana	1	5.6
These bison are close to Denver	1	5.6
These bison are happy in this environment	1	5.6
These bison roam free	1	5.6
Bison were almost made extinct	1	5.6
Bison were once hunted fiercely	1	5.6
Total	22	



Question 4: What is it like to see bison in nature at the refuge?

When asked what it is like to see bison in nature at the refuge, visitors most commonly used words such as *amazing, awesome, cool, awe-inspiring, historical, majestic, and magnificent*.

What is it like to see bison in nature at the Refuge?		
Rocky Mountain Arsenal respondents (n=18)	Frequency	Percent of respondents
Amazing/awesome/cool	6	33.3
Awe-inspiring	4	22.2
Historical	2	11.1
Majestic/magnificent	2	11.1
Beautiful/gorgeous	1	5.6
Breathtaking	1	5.6
Mystifying	1	5.6
Unique	1	5.6
Exciting	1	5.6
Fun	1	5.6
Huge	1	5.6
Grounding	1	5.6
Natural	1	5.6
Relaxing	1	5.6
They stand around and eat grass all day	1	5.6
I feel pride	1	5.6
I don't know	1	5.6
Total	27	



Question 5: When you think about bison in general, what comes to mind?

Bison resonate as cultural and historical touchstones for Refuge visitors. Visitors mentioned *Native Americans* in response to this question, as well as bison as an integral part of *American history and heritage*. Visitors also associated bison with *the Wild West*, *the Plains*, and *the American West*. However, visitors did not associate Refuge bison with the contemporary bison conservation movement or with grassland recovery and stewardship.

When you think about bison in general, what comes to mind?		
Rocky Mountain Arsenal respondents (n=18)	Frequency	Percent of respondents
Native Americans	5	27.8
American history/heritage	3	16.7
The Wild West	3	16.7
The Plains	3	16.7
The American West	2	11.1
Ecosystem	2	11.1
Wild/dangerous	2	11.1
They belong here	1	5.6
Beastly	1	5.6
Hairy	1	5.6
Huge	1	5.6
Large herds	1	5.6
Bison babies	1	5.6
Bison recovery and conservation	1	5.6
Extinction	1	5.6
Majestic	1	5.6
Natural	1	5.6
Prairies	1	5.6
Yellowstone	1	5.6
Total	32	



Discussion and Recommendations

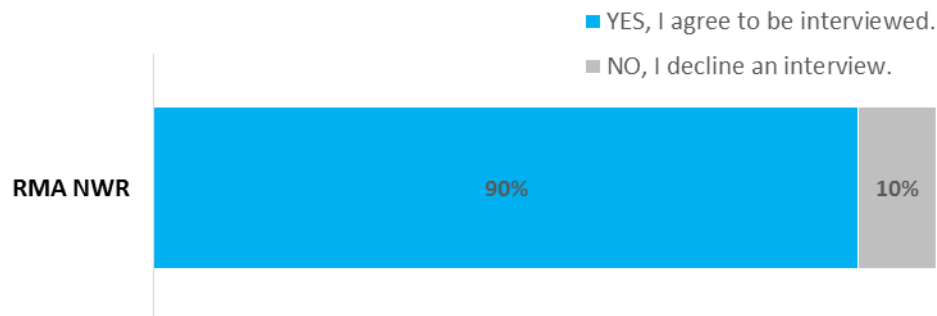
In summary, the main findings from this research are:

- 1. The Rocky Mountain Arsenal NWR had a high visitor response rate for the 2015 study; 9 in 10 visitors agreed to be interviewed for this research.** This high response rate indicates a high degree of cooperation by Refuge visitors and gives us greater confidence that the data from the study sample are representative of the larger Refuge visitor population.

Visitor Intercept Interview Response Rate at RMA

9 in 10 Refuge visitors agreed to be interviewed.

N=111



- 2. Visitors to the Arsenal in 2015 were typically white, college-educated, Generation Xers between the ages of 36 and 55 who visit in a group of two adults and no children.** These results closely mirror the demographic findings from the 2012 Visitor Study (Dietsch et al. 2013) but contrast the ethnic diversity of the seven county metro Denver region in which 66% of residents are white, 22% are Hispanic and 6% are black (U.S. Census Bureau, ACS 2010).

RMA Visitor Demographics Summary	
2015 Visitor Study	2012 Visitor Survey
<ul style="list-style-type: none">53% female; 46% male; 1% female-to-male transgender	<ul style="list-style-type: none">52% female; 48% male
<ul style="list-style-type: none">87% white; 6% Hispanic; 1% black; 2% Asian, 2% American Indian; 2% Multiple ethnicities	<ul style="list-style-type: none">95% white; 6% Hispanic; 1% black
<ul style="list-style-type: none">66% Bachelor's degree or higher	<ul style="list-style-type: none">66% Bachelor's degree or higher
<ul style="list-style-type: none">2 adults, no children	<ul style="list-style-type: none">2 adults, 1 child



- 3. Visitor Use Profile:** More than two-thirds (72%) of visitors were visiting the Refuge for the first time, almost half (49%) planned to spend 1 to 2 hours on-site and the most popular visitor recreation activity was day hiking (38%) followed by taking a scenic drive (24%). Visitors who knew where they planned to recreate most frequently mentioned the Wildlife Drive, Lake Mary and/or Lake Ladora. 1 in 5 visitors found out about the Refuge online (23%) or by word-of-mouth from a friend or family member (22%).

Rocky Mountain Arsenal National Wildlife Refuge: Visitor Use Profile
<ul style="list-style-type: none">• 72% are first-time visitors• Average 2 hours on-site (49% said between 1 and 2 hours)• 38% are Day Hiking; 24% are Taking a Scenic Drive• Recreate at the Wildlife Drive or at Lake Mary and/or Lake Ladora• Heard of the park Online (23%); From a friend or family member (22%); From a map (online or print) (13%); and Driving by (12%)

- 4. Overall, Refuge visitors demonstrated a strong sense of connection to the Refuge** reporting a mean place attachment scale score of 4.15 (where 4=Agree and 5=Strongly Agree), and the majority said the Refuge was important to them as part of the lands protected by the National Wildlife Refuge system.
- 5. The bison herd motivates Refuge visitation. Almost 1 in 5 people (20%) described the bison herd as one of the reasons inspiring their visit.**

Bison are a Motivation for Refuge Visitation

16% of visitors (almost 1 in 5) mentioned the bison herd as one of the motivations for their Refuge visit.

N=100

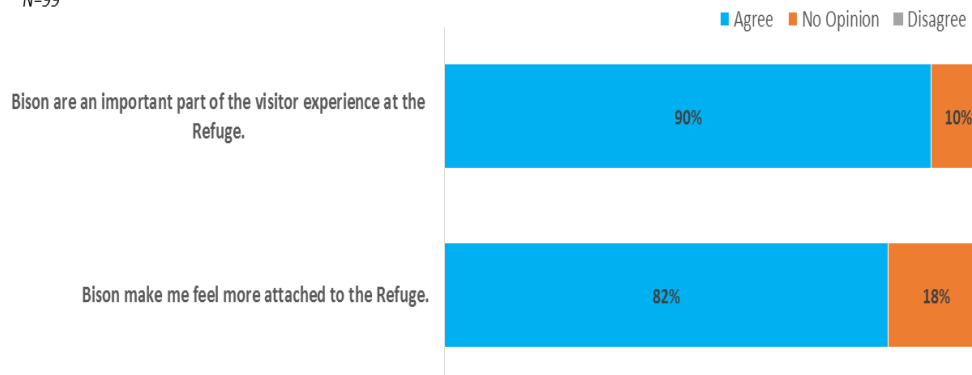




6. Bison are an important part of the visitor experience at the Refuge. Nine in 10 visitors agreed with the statement, “Bison are an important part of the visitor experience at the refuge.” Eight in 10 visitors agreed that the bison herd increased their sense of connection to the Refuge.

2015 visitors overwhelmingly agreed that bison were an important part of the Refuge visitor experience, and enhanced their sense of connection to the Refuge.

N=99



7. When asked to share their knowledge about Refuge bison herd, visitors consistently voiced their appreciation and awe for the herd but did not know a lot about the herd’s origin, ownership, or importance in the contemporary bison conservation movement.

In summary, the Refuge’s bison herd motivates visitation for almost 20% of Refuge visitors. The herd is seen by visitors as an asset and natural amenity that adds value to their experience and sense of connection to the Refuge. Looking forward, the Refuge’s conservation bison herd is an opportunity for attracting broader audiences and supporters, across metropolitan Denver and more globally, to the Refuge and connecting them to the grassland ecosystem it protects. Moreover, the Refuge bison herd is a highly recognizable ambassador herd (and part of the U.S. Fish and Wildlife Service’s bison meta-population critical for conservation) that can be interpreted to more effectively demonstrate to urban audiences the importance and value of grassland restoration and contemporary bison recovery across the American West.

Management and Community Engagement Recommendations

In light of this report’s key findings on the meaning and importance of bison to the Refuge visitor community, we (the report authors) recommend the following actions for the Rocky Mountain Arsenal NWR and its partners:

1. Build on the appeal of Refuge bison as a charismatic species that add value to the visitor experience to motivate metropolitan Denver youth and adults to visit this important protected area. Highlighting the Refuge bison may be a key “hook” for introducing these urban audiences to the grasslands in their backyard.
2. In concert with partners, develop more on-site programming, citizen science and site interpretation opportunities to engage metropolitan Denver youth and adults in a culture of grassland stewardship. These opportunities will foster longer-term relationships and deeper connections to this landscape.



3. Explore if and how on-site bison programming can help increase Refuge audience diversity, and engage under-served audiences in metropolitan Denver. Building on the work of Dietsch et al. (2013), and through additional focus groups and community assessments, understand if bison (and wildlife) appeal to ethnically diverse urban audiences of prospective visitors, and identify how to best engage these communities.
4. To foster a better understanding of the purpose, importance and origin of the Refuge bison herd among Refuge visitors and audiences, provide additional information and interpretation about the Refuge bison herd on social media, and through interpretive signage along the Wildlife Trail. Also, include information about these topics in any on-site programming.
5. Through additional visitor studies, continue to monitor the Refuge visitor population's experiences with and knowledge about the Refuge bison herd.



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